Table of Contents

Introduction

TO EDUCATORS:

This study guide is designed to help you and your students begin thinking about recycling—why it's important, and how resources can be conserved and protected. It is intended to help you and your students understand what solid waste is, where it comes from, why it's a problem and what can be done about it. This guide includes an overview of solid waste and recycling, a glossary of terms, suggested activities, and a list of related Wisconsin Model Academic Standards (WMASs) for Science, Environmental Education, Social Studies, Math, Family and Consumer Education and Health. There is also a resource section with a list of recycling publications, other curriculum and recycling organizations for the state of Wisconsin.

Consider talking with your students about solid waste, recycling and waste reduction before beginning your lessons to learn what they already know and what they think about it. Where are their trash and recyclables taken? Have they ever visited a landfill? What did people do before there were plastic bags, aluminum cans or trash removal services? Do people in other countries make as much trash or recycle as much as Americans do? By finding out your students' thoughts and opinions, you can help them connect new concepts with what they already know.

We encourage you to adapt the activities to meet your students' needs. You are welcome to reproduce any part of this guide for distribution to students and other educators.

Note:

- Words that appear in ***bold and italics*** are defined in the Glossary of Terms.
- Sections marked with an ❋ are based on materials from the *A-Way With Waste* curriculum guide, a program of the Washington State Department of Ecology, or from materials of the California Integrated Waste Management Board.

The recycling activities in this guide are written for 4th to 8th grade students; however, many of the activities are suitable for older or younger students. There is also a K-3 supplement for this guide, DNR publication #CE-2004 2007.

At the beginning of each activity you will find a list of relevant Department of Public Instruction (DPI) Wisconsin Model Academic Standards. The following letters are used to identify the appropriate subject(s): SC=Science, EE=Environmental Education, SS=Social Studies, M=Math, FCE=Family and Consumer Education and H=Health.

People in Wisconsin throw out everything from toothbrushes to old TV sets, food scraps to plastic bags, cell phones to oil filters. If you added up all the waste from your house, from the store where you shopped and from the restaurant where you ate, it would amount to 4.7 pounds per person of solid waste thrown into the trash every day. Multiply that by 365 days per year, then by 5.4 million Wisconsin citizens, and your results would show that

WISCONSIN GENERATES MORE THAN
4.6 MILLION TONS
OF TRASH EACH YEAR.

This is called ***municipal solid waste***. This much ***trash*** is enough to pile a typical city street 3 feet deep, curb to curb, for 500 miles—more than the distance from Superior to Chicago! Or, if compressed, the way it is in landfills, that much waste would bury a 200-acre farm under 28 feet of trash each year. The previous information covers municipal solid waste—the residential and commercial waste we personally produce every day. Another category of waste is called ***non-municipal waste*** or ***industrial waste***. This is the waste industries, power plants and paper mills generate as they produce the products we use. It represents about 9.31 pounds per person per day. The good news is… we recycle 49 percent of the industrial waste we generate.

Where does it all go?

About 60 percent of Wisconsin's trash or municipal solid waste ends up in the state's 41 or so licensed municipal landfills. A ***landfill*** is a place where trash is dumped, compacted and covered with dirt. Covering the trash controls blowing paper, odors, insects and rodents and keeps water out of the landfill. All of the licensed landfills in Wisconsin are sanitary landfills—designed, built and operated according to state-of-the-art standards to prevent pollution problems.

Approximately 40 percent of the rest of our trash gets ***recycled***, composted or combusted with ***energy recovered***. It's taken from your house or a drop-off site to one of the 150 or so ***material recovery facilities*** throughout the state. Here cardboard, newspaper, magazines, office paper, bottles and cans are sorted and sold to manufacturers who make new products out of them. Tires, vehicle batteries, motor oil and major appliances are also recycled, and about half the yard waste is managed "at home" by people who leave grass clippings on their lawn and ***compost*** leaves and herbaceous plants.

Unfortunately, some waste is still dumped along roadsides, in public parks, or in other non-approved locations. Except for household wastes discarded on the homeowner's property, it is illegal to discard or incinerate ***garbage***, trash, industrial waste, farm chemicals and other waste in places that aren't approved by the state.

The ***open burning*** of garbage and recyclables is prohibited in the state of Wisconsin. Burn barrels and burn piles often emit acid vapors, cancer-causing tars, and "heavy metals" such as lead, cadmium and chromium, as well as unhealthy levels of carbon monoxide. These ***toxins*** are spread to us when they fall on crops we consume and also directly through the air we breathe.

Discarding waste in unsafe ways and in non-approved places can endanger the environment upon which we depend. Thus, each of us becomes responsible for what we throw away and the impact this waste may have, on our environment and ourselves.

FOR MORE INFORMATION

on open burning, please visit the WI DNR website: **http://dnr.wi.gov/environmentprotect/ob/**

NOT IN MY BACKYARD!

Finding places to put landfills is not easy. Few people are eager to live near a landfill, an attitude sometimes called the NIMBY phenomenon—"Not In My Back Yard!"

Many people believe that the construction and operation of a landfill results in traffic, noise, dust, litter, aesthetic loss, declining property values, ***groundwater*** contamination and other hazardous waste pollution. While these fears may have been justified in the past, modern landfill design, construction and management are now able to minimize most of these problems. Unfortunately, the NIMBY phenomenon also applies to the siting of recycling centers and municipal composting facilities.

What's the Problem?

Over the last three decades, public awareness of environmental problems has increased; stricter federal regulations regarding the siting, construction, daily operation, closure and post-closure monitoring of landfills have been developed; and the amount of municipal solid waste generated in the United States has increased at a rate faster than our population growth. This combination of factors has caused the cost to operate a landfill to increase, the number of landfills to decrease and a subsequent shortage in landfill capacity in many parts of the country.

The public believes that we are running out of space for landfills. Technically, we have many sites to locate modern, sanitary landfills that will meet state and federal requirements. These new ***sanitary landfills*** are designed to be clean and to contain and collect ***leachate*** and ***methane gas*** that result from the decomposition of ***organic*** materials or the gradual breakdown of ***inorganic*** materials. However, the economics of landfill operation and the politics of landfill siting make it difficult to get new landfills built—as no one wants a landfill near them, and everyone hates to pay more for trash disposal.

The amount of ***natural resources*** we throw away is another part of the solid waste problem that is not so apparent. Wisconsin's trash contains enough energy to heat over 350,000 homes a year, and even though we're recycling tons of metals, glass, plastic and paper, we are still throwing away a lot of valuable natural resources. Not only do we need to recycle more, we need to move beyond recycling and do more to reduce waste before it is produced.

Wisconsin's trash contains enough energy

WISCONSIN'S RECYCLING SUCCESSES

Wisconsin's nationally recognized recycling program was signed into law on Earth Day April 22, 1990 and fully put into action by 1995. Wisconsin was the first state to have statewide bans on landfilling large appliances, used motor oil, vehicle batteries, yard waste, steel containers, aluminum cans, corrugated paper, glass containers, magazines, newspapers, office paper, and plastic containers. Over 90 percent of households in Wisconsin recycle, which helps divert 1.6 million tons of materials from landfills each year. Not only is recycling the right thing to do, it adds to the 5.4 billion dollar environmental industry in Wisconsin and supports thousands of jobs.

What is required to be recycled in Wisconsin?

- Aluminum containers, glass containers, steel containers, containers made from a combination of steel and aluminum (bi-metal cans)
- Plastic containers #1 through #7. Currently a variance issued by the DNR allows plastic containers #3 through #7 to be landfilled or incinerated. If at some future time, the DNR determines that adequate markets for these plastics exist, they will be banned from disposal.
- Magazines and other materials printed on similar paper
- Newspaper and office paper
- Major appliance including air conditioners, clothes washers and dryers, dishwashers, refrigerators, freezers, stoves, ovens, dehumidifiers, furnaces, boilers, and water heaters
- Yard waste, including grass clippings, leaves, yard and garden debris
- Lead acid vehicle batteries, automotive waste oils and waste tires (except when incinerated with energy recovery)

to heat over 350,000 homes a year

Who has to recycle?

Wisconsin's recycling requirements apply to everyone in the state, and at all locations. This includes schools, public places, businesses, special events, homes and apartments. The responsibility to ensure that recycling options are available at all locations lies with a local ***Responsible Unit*** (RU). An RU can be a municipality, county or tribe's solid waste management system or other unit of local government that is responsible for the planning, operating and funding of a recycling program. Each RU must develop and implement a recycling program to manage the banned materials generated within its region in compliance with state laws.

THE BENEFITS Recycling saves natural resources, contributes to improved air and water quality, and reduces the need for landfill expansion and construction by "saving" landfill space. Recycling also benefits Wisconsin's economy through the creation of new industries, business opportunities and thousands of good paying jobs.

THE FUTURE Wisconsin has a strong, successful residential recycling program. However, it is clear that more effort is needed to improve and increase recycling in non-residential places. Areas for improvement include business recycling (offices, gas stations, stores), construction and demolition waste, electronics, recycling when people are traveling and at special events. As Americans progressively generate more waste, traditional methods of waste diversion—recycling, reusing and composting—need to be improved by alternative approaches to waste reduction.

What else can we do with waste?

Wisconsin already reuses, recycles, composts or recovers energy from almost 40 percent (by weight) of its residential and commercial waste each year, and 49 percent of its industrial waste (that figure would increase if you add the 1,167,300 tons of municipal waste water sewage sludge that is land spread annually). This reduces the need for landfill space, saves the cost of disposal and reuses valuable natural resources. The overall goal of Wisconsin's recycling law is to reduce the volume of discarded items.

The following list includes options for managing solid waste, and are listed in order from most to least desirable:

Reduce the quantity of waste produced. For example, some products and packaging are designed to use less material, to be recyclable or to contain fewer hazardous chemicals. We can produce less waste through selective shopping. Also, we can encourage reduction by expressing our views about products and packaging to retailers, industry and government.

Reuse items. Food containers, old furniture, clothes, tires, appliances and automobiles, or their parts, industrial shipping containers (barrels, pallets, cardboard boxes) and many more items can be reused.

Recycle. For instance, recycled newspaper can be made into newsprint, paper bags, house insulation, egg cartons, animal bedding or cardboard. Glass and aluminum from beverage containers can be made into new containers. Cooking oils and meat fats can be made into chemicals and cosmetics, coal ash into shingles, and concrete and plastic bottles into artificial lumber, carpeting and winter jackets.

Compost organic wastes. Gardeners know both the ease and the value of composting food and yard wastes to create rich ***humus*** that improves soil fertility and texture. Some businesses also can compost their organic wastes. For example, cheese whey, organic sludge from paper mills and sewage treatment plants, and the remains from processing fish can be composted. Food wastes from grocery stores and restaurants are also able to be composted.

Incineration of waste with energy recovery. Each ton of solid waste has the energy equivalent of 70 gallons of gasoline—that's pretty valuable considering the rising costs of gasoline worldwide.

Landfill non-recoverable items. We may always need landfills, but Wisconsin is working to decrease this need. Using the techniques described above, Wisconsin aims to reduce the need for landfills.

Incineration of waste without energy recovery. Though this may be the lowest ranking option for disposal of waste, it is sometimes the only option for safe disposal of medical and hazardous wastes.

None of these options is the sole solution to our waste disposal problem. Each option has side effects that must be considered when we are selecting the best solution to each solid waste problem.

What can we do?

What could you do to voice your opinion about solid waste issues in your community?

Here are some ideas to consider:

- Buy long-lasting products rather than items that have a shorter life span and end up as waste sooner.
- Buy goods in returnable and recyclable containers.
- Learn where you can take items to be recycled and show your support by recycling and buying items made with recycled content.
- Composting food wastes, leaves and grass clippings.
- Find other people in your town who are interested in reducing waste, promoting recycling, inventing new uses for old materials and fighting litter. Work together with these people to promote waste reduction and recycling.
- Take an active interest in how your solid waste management dollars are spent. Compare your community's hauling and disposal costs with those of neighboring towns. Investigate the quality of your local landfill and the measures being taken to make it as safe and long-lasting as possible.
- Learn how nature recycles materials. Is much wasted? (e.g., mushrooms recycling soil nutrients)

You can start by looking at what you throw away at home. Each person's "drop in the bucket" adds up to create the trash problem. If each drop becomes smaller, the problem will be reduced.

Everyone produces some waste, but you don't have to be a "super consumer." One way to help the issue is to think about the goods, services and activities you buy or support. In what ways do they contribute to the solid waste problem? How could you purchase and dispose of items in other ways that would generate less trash?

Source: Waste Management World, September-October 2005

IN FACT

In 2004, two-thirds of beverage containers used were not recycled in the United States. Had they been, the energy saved could have supplied power for more than 2 million homes for one year.

Wisconsin's solid waste management goal is to find the best political, economic, social and personal ways to manage our waste while keeping the environment healthy. Each of us contributes to the solid waste problem.

EACH OF US CAN HELP SOLVE IT.